

## ***SAFETY LESSONS LEARNED***

**ALASKA DISTRICT  
PACIFIC OCEAN DIVISION  
U.S. ARMY CORPS OF ENGINEERS  
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### **BRIEF DESCRIPTION OF ACCIDENT**

At approximately 0900, a carpenter fell through an opening in a second floor deck of a two-story wood framed building under construction. The opening was to later form a stairwell. His fall continued through the matching opening in the first floor deck. He struck the concrete basement floor sustaining severe injuries to the head and spine. At the time of the accident the carpenter was believed to be removing a fall protection anchor located in the narrow space between the edge of the building and the floor opening.

### **INSPECTION RESULTS**

Inspection revealed that the carpenter was wearing a fall protection harness and a 6-ft.-long shock-absorbing lanyard but was not hooked to a fall protection anchor at the time. It was also determined that the opening was not covered or barricaded at the time of the accident. Although the contractor had a fall protection plan and had provided the worker with fall protection training numerous items were found to be non-complying. These included:

- The plan did not include the use of 6-ft. lanyards between the users' fall protection harnesses and retractable fall-limiting cable lanyards. Use of the 6-ft. lanyard in this configuration would not have limited any fall to 6-ft. or less as required.
- The hook on the end of the worker's lanyard would not fit into the openings in the anchors being used and he did not have a D-ring suitable for making the connection.
- Several aspects of anchor installation were not in accordance with manufacturer's requirements. These included the location of some anchors within 6-ft. of the edge of the deck, the use of wrong nails to attach the anchors to the deck and that some of the nails missed the underlying framing and just penetrated the decking.

### **EM 385-1-1 VIOLATIONS (Paragraph violated is noted in parentheses)**

1. The opening was not barricaded or covered as required. (24.A.01)
2. At the time of the accident, the carpenter was not protected from a fall of 6-ft. or more. (21.A.15)
3. The carpenter was either improperly trained (21.A.16(2)) in the installation, use and dismantling of fall protection systems or failed to properly implement the training(01.A.03).

## **LESSONS LEARNED**

As with most accidents a number of factors came together to allow this to happen. Key lessons learned include the following:

1. Floor and wall holes and openings pose a substantial hazard and are the subject of their own Section 24 of EM 385-1-1. On Corps jobs, openings in floors must be covered or barricaded. Use of personal fall protection to mitigate this hazard is not an acceptable alternative. This is in keeping with the preferred use of engineering solutions to hazards ahead of using personal protective equipment (PPE). Note that Section 24 is not cited in the EM 385-1-1 Index under Fall protection nor referenced in the fall protection sections. Reviewers must make a special effort to assure that this requirement is properly covered in contractor fall protection plans and implemented in the field.
2. When using personal protective equipment for fall protection, the devil is in the details. Manufacturers' generally provide systems that include anchors, lanyards and harnesses. Installation and use should comply with the manufacturer's instructions since this represents the testing that was done to assure that OSHA minimum requirements are met. In the case at hand, for example, the manufacturer stated that the anchors should be installed no closer than 6-ft. from the edge. If the anchor being removed was not located in the narrow space between the edge of the building and the opening, the carpenter may not have fallen through the opening. It was also noted that the wrong nails had been used to install the anchor. Although this didn't contribute to this accident, the smaller than manufacturer-provided nails that were used may not have developed enough strength had the anchor been subjected to fall arrest loading. Lastly, it has been noted that some employees were hooking one lanyard to another. With this configuration the unrestrained fall distance exceeded 6-ft. Although this did not contribute to this accident either, had the carpenter fallen while hooked up this way, the anchor would have been subjected to higher than anticipated loading.

In conclusion, Government reviewers must assure that proper review and acceptance of contractor fall protection plans are accomplished and include covering or barricading floor openings if they are present on the project. Government Quality Assurance representatives should become familiar with their contractors' fall protection plan and the manufacturer's instructions for use of the fall protection PPE being used on the jobsite. Fall protection equipment should be checked to assure it is being installed, used and removed correctly in accordance with manufacturer's instructions.

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